WHAT IS CLAIMED IS:

1. A coaxial multiplex position detecting apparatus for a rotating machine, comprising:

a stator including stator pieces, each stator piece individually being split in a circumferential direction of the stator, an exciting current winding, and a detection winding, the exciting current winding and the detection winding being wound on the respective stator pieces; and

a plurality of rotors disposed on outside and inside positions of the stator in a radial direction of the stator, the respective rotors having convex and recess portions in accordance with the number of poles that the respective rotors have and having different numbers of poles according to the inside and outside positions of the rotors from each other, revolution positions of the respective rotors being determined according to an output signal of the detection winding of the stator.

2. A coaxial multiplex position detecting apparatus for a rotating machine as claimed in claim 1, wherein the detection winding is constituted by four windings wound on the stator pieces in such a manner a phase of each output signal of the four windings is different for each of 90 degrees.

3. A coaxial multiplex position detecting apparatus for a rotating machine as claimed in claim 1, wherein the output signal from the detection winding detects the position of one of the rotors whose number of poles are greater than those of the

other rotors by adding the output signal of the detection winding whose phase is 180° different from the output signal of the detection wounding to the output signal of the same detection winding and the position of the other rotor whose number of poles is less than those of the one of the rotors is detected using the position signal of the one of the rotors whose detected number of poles is greater than those of the other of the rotors.

4. A coaxial multiplex position detecting apparatus for a rotating machine as claimed in claim 2, wherein the four windings constituting the detection winding are deviated from each other by 90 degrees and a ratio of the number of poles of the respective rotors is 1:2 and the signals outputted from the four windings are as follows:

first winding of the four windings;

$V1 = A \cdot (\cos\theta + \cos2'\theta)$

second winding of the four windings;

$V2 = A \cdot (\cos(\theta - 90) + \cos2(\theta' - 90))$

third winding of the four windings;

$V3 = A \cdot (\cos(\theta - 180) + \cos2(\theta' - 180))$

fourth winding of the four windings;

$V4 = A \cdot (\cos(\theta - 270) + \cos2(\theta' - 270))$,

wherein θ denotes a revolution position of one of the rotors whose pole number is greater than the other of the rotors, θ' denotes a revolution position of the other of the rotors whose pole number is less than the one of the rotors, and A denotes an exciting current signal and ordinarily sinusoidal wave of $A = E\sin(\omega t)$ is added.

5. A coaxial multiplex position detecting apparatus for a rotating machine as claimed in claim 1, wherein the position (θ) of the one of the rotors whose number of poles is greater than the other of the rotors is detected on the basis of the following equations: V1 - (V1 + V3)/2 to derive A$\cos\theta$ and V2-(V2 + V4)/2 to derive A$\sin\theta$ and the position (θ') of the other rotor is detected on the basis of A$\cos\theta$ and A$\sin\theta$, wherein A denotes a constant.

6. A coaxial multiplex position detecting apparatus for a rotating machine as claimed in claim 5, wherein the position (θ) of the one of the rotors whose number of poles is greater than the other of the rotors is detected by inputting A$\cos\theta$ and A$\sin\theta$ into a resolver-and-digital converter.

7. A coaxial multiplex detecting apparatus for a rotating machine as claimed in claim 6, wherein the resolver-and-digital converter is used to detect the respective positions (θ, θ') of the rotors.

8. A coaxial multiplex detecting apparatus for a rotating machine as claimed in claim 6, wherein A$\cos\theta$ and V1 are used to derive A$\cos 2\theta'$ and A$\sin 2\theta'$ and A$\cos 2\theta'$ and A$\sin 2\theta'$ are inputted to the resolver-and-digital converter to derive $2\theta'$.

9. A method applicable to a coaxial multiplex detecting apparatus for a rotating machine, comprising: providing a stator including stator

pieces, each stator piece individually being split in a circumferential direction of the stator, an exciting current winding, and a detection winding, the exciting current winding and the detection winding being wound on the respective stator pieces; providing a plurality of rotors disposed on outside and inside positions of the stator in a radial direction of the stator, the respective rotors having convex and recess portions in accordance with the number of poles that the respective rotors have and having different numbers of poles according to the inside and outside positions of the rotors from each other; and determining revolution positions of the respective rotors according to an output signal of the detection winding of the stator.

10. A rotating machine in a coaxial structure comprising:

a coaxial multiplex position detector comprising; a stator including stator pieces, each stator piece individually being split in a circumferential direction of the stator, an exciting current winding, and a detection winding, the exciting current and the detection winding being wound on the respective stator pieces; and two rotors disposed on outside and inside positions in a radial direction of the stator, the respective rotors having convex and recess portions in accordance with the number of poles that the respective rotors have and having different numbers of poles according to the inside and outside positions of the rotors from each other, the rotor positions being determined according to outputs of the detection winding of the stator,

one of the outer and inner rotors of the coaxial multiplex position detector, one of the inner rotor and the outer rotor of the coaxial multiplex position detector being attached onto an outer rotor of the rotating machine, the other rotor being attached onto an inner rotor of the rotating machine, and the stator of the coaxial multiplex position detector being fixed onto a stator of the rotating machine.